STATE OF MINNESOTA
OFFICE OF THE ATTORNEY GENERAL
ST. PAUL 55155

WARREN SPANNAUS
ATTORNEY GENERAL

ADDRESS REPLY TO
ATTORNEY GENERAL'S OFFICE
POLLUTION CONTROL DIVISION
1935 WEST COUNTY ROAD B-2
ROSEVILLE, MN 55113
TELEPHONE (612) 296-7342

June 10, 1982

EXPRESS MAIL

David Warshawsky
Department of Environmental Health
University of Cincinnati Medical
Center
3223 Eden Avenue
Cincinnati, Ohio 45267

P R I V I L E G E D

Dear Dr. Warshawsky:

Enclosed are (1) copies of the materials presented by the Reilly Tar consultants at the October 9, 1980, settlement meeeting and (2) the packet provided me by Vincent Garry on his transformation studies.

I have your notes from your meeting with Dr. Garry and have been advised that we will have an opportunity to discuss these matters in a conference call to be arranged shortly by EPA.

Very truly yours,

Steve Shakman

STEPHEN SHAKMAN
Special Assistant
Attorney General

SS:mah

Enc.

cc: Michael Kosakowski, EPA (w/o encl)
Robert Leininger, EPA (w/o encl)
Erica Dolgin, DOJ (w/o encl)

P.S. Enclosed is the pleadings register per our phone conversation today.
S.S.

SUMMARY OF QUALIFICATIONS

David Warshawsky Ph.D.

Dr. David Warshawsky is Assistant Professor, Department of Environmental Health, University of Cincinnati College of Medicine in Cincinnati, OH. He received his Ph.D. from the Department of Chemistry of the University of Cincinnati in 1972.

Dr. Warshawsky's major research interests include the binding of polynuclear aromatic hydrocarbons (PAHs) to biopolymers, chemical and physical properties of PAHs and their relation to the environment and the metabolism of PAHs. He has authored or co-authored over 60 publications, abstracts and presentations.

Dr. Warshawsky is a member of the American Chemical Society, the American Association for the Advancement of Science and the American Association for Cancer Research. He has been honored with admission into Sigma Xi, Phi Lambda Upsilon and also with an NIH Postdoctoral Fellowship. Dr. Warshawsky provided extensive technical assistance to Dr. Eula Bingham during her term as Assistant Secretary of Labor for the Occupational Safety and Health Administration, Department of Labor.

A Curriculum Vitae and selected publications are attached which further highlight Dr. David Warshawsky's professional career.

Curriculum Vitae

Name: David Warshawsky

Place of Birth: London, England

Date of Birth: September 24, 1944

Education: Ph.D., Department of Chemistry, University of Cincinnati, 1972

M.S., Chemistry, Rutgers University, 1968

B.S., Chemistry, University of Illinois, 1966

Experience:

1976 - present: Assistant Professor, Department of Environmental Health, University of Cincinnati, College of Medicine

1975-1976: Senior Research Associate, Department of Environmental Health, University of Cincinnati, College of Medicine

1972-1974: Postdoctoral Fellow, Chemical Biodynamics Lab., University of California at Berkeley

1968: Research Assistant, Department of Chemistry, Rutgers University

1965-1966: Senior Research, Department of Chemistry, University of Illinois.

Honors:

Sigma Xi
Phi Lambda Upsilon
NIH Postdoctoral Fellowship 1972-73

Societies:

American Chemical Society
American Society for Photobiology
American Association for the Advancement of Science
Inter-American Photochemical Society
American Association for Cancer Research

Activities:

Departmental Activities:

Chairman, Carcinogen Safety Committee for Department of Environmental Health. Developed carcinogen safety guidelines for the Department. Review all protocols for work with carcinogens, 1975-present.

Member, Student Affairs Committee, Department of Environmental Health, 1976-1979.

Activities:

Departmental Activities: (continued)

Member, Advisory Committee for Negative Pressure Hoods for Department of Environmental Health, 1976-1978.

Member, Instrumentation Committee. Review instrumentation departmental needs and collate the departmental resources, 1979-present.

Member, GC. Mass spectrometer Committee. Oversee the university facility to be housed in the Department of Environmental Health, 1981-

Coordinater of the Mutagenesis-Carcinogenesis research area. To integrate and coordinate individual research efforts within the Department, 1981-

University Activities:

Speaker at Cancer Forum for Greater Cincinnati Cancer Control Program August 6, 1981

Member of University-Wide Graduate Faculty, 1981 -

Coordinator and host for a short course on Safe Handling of Chemical Carcinogens in the Laboratory, sponsored by the Department of Safety at NIH, May 5-7, 1981 in Kehoe Auditorium, Kettering Laboratory.

One of four members of proposal writing committee for Ohio Coal Research Laboratory (OCRLA), Consortium of 12 State Universities in Ohio, - responsible for development of environmental and health programs for the OCRLA which were submitted as part of proposal to State of Ohio and U.S. Department of Energy resulting in funding of four University of Cincinnati proposals by the OCRLA, Summer 1979.

Member of Ad Hoc Committee on Hazards Safety Officer - Discuss guidelines relating to the development of an office dealing with major health hazards to employees, 1978.

Member of Executive Committee, University of Cincinnati Faculty Council on Jewish Affairs, 1976-present. Treasurer - 1978-1980.

Department of Physiology Review Committee, 1978, University of Cincinnati College of Medicine.

Community Activities:

Host for guest speaker, Dr. Eula Bingham, Director of Occupational Safety and Health Administration on "Enforcement Strategy for Hazardous Chemicals", at local American Chemical Society meeting, Cincinnati Section held at EPA Research Center, March 12, 1979.

Cincinnati Environmental Advisory Council - 1977-78, Subcommittee - Water Quality.

Coordinated a sponsored program by Department of Environmental Health and Cincinnati Chamber of Commerce, October 5, 1978, for small businesses. Symposium on Cancer and the Worker, Carcinogens in the Workplace.

Consultationships:

Technical Consultant - OSHA - conduct a study of OSHA laboratory in Salt Lake City, Utah, and provide other technical support and assistance to Assistant Secretary of Labor on such matters as engineering feasibility variances and determination, July 1977 - Oct. 1977.

Technical Consultant - Pittsburgh Energy Technology Center, Pittsburgh, PA., Summer of 1977, developed biological testing program on coal liquefaction and gasification products for Department of Energy at Pittsburgh.

Technical Consultant - NIOSH, November 1978 for internal research project.

Technical Consultant - OSHA - provide services, written reports and discussion of technical approaches required to Directorate of Technical Support in areas of asphalt and coal tar pitch and review of technical documents - August 1979-Oct. 1981.

Consultant - develop a chapter for NIOSH, entitled "Carcinogenesis & Mutagenesis," for next edition of text "The Industrial Environment - Its Evaluation and Control", March 1981 - December 1981.

Workshop:

Workshop on the Health and Environmental Effects of Oil Shale Technology sponsored by DOE, HEW, and EPA, Denver, Colorado, April 16-20, 1978. Future Research.

Workshop and short course on the Safe Handling of Chemical Carcinogens sponsored by NIH, and the National Cancer Institute, September 16-18, 1980. Representative of the department - to upgrade existing carcinogen guidelines and incorporate new ideas.

Graduate Teaching Experience:

Mechanisms in Chemical Carcinogenesis 26-904-980, 3 G. credits. Cource examines chemical carcinogenesis through lectures, reading of major literature in the field and discussion of contemporary research. Types and classes of carcinogens found in environment and examined, as well as metabolite formation and cellular binding. The course conducts a critical analysis of present literature including trends in present research effort, theories of chemical carcinogenesis and methods of analysis. Instructor, Spring 1975-79, Winter 1980-82.

Carcinogenesis, 26-904-838, 3 G. credits. Overview course - The sources, uses, exposure health effects, and regulation of various physical and chemical carcinogens and mutagens are discussed. Instructor, Winter 1977, 1979, 1981.

Introduction to Environmental Health, 26-904-745, 3 G. credits. A general study of applications of biological and medical principles and disciplines to the recognition and resolution of problems of environmental health. Instructor, Fall 1978-81.

Toxicology III, 26-904-881, 3 G. credits, Guest Lecture, Fall 1976-80.

Biological Effects of Air Pollutants, 26-904-771, Guest Lecturer, Spring 1976-79, 3 G. credits.

Graduate Teaching Experience: (continued)

Ph.D. Dissertation Committee	-	Joe Cornicelli	1977-79
		Paul Schulte	1979-present
		Rita Loch	1979-present
		John Dooley	1980-
		Ray York	1980-
		Chris Cubbison	1981-
		Paul Sichak	1981-
	(chairman)	David Stong	1982-
		Ann Jarabek	1982-
Masters Advisory Committee	-	Debbie Hurst	1980-

Ph.D. Qualifying Examination Committee	-	Michael Dourson	1977
		Chris Cubbison	1979
		Bruce Peirano	1980
		James Hoadley	1980
	(non-voting chairman)	Ann Jarabek	1981
		David Stong	1981
		Pat McGinnis	1981
	(non-voting chairman)	Bernadette Nagel	1982
Masters Reading Committee	-	Jane Brown	1977

Graduate Student Advisor:	Constance Menefee	1978-79
	Ann Jarabek	1978-81
	Bernadette Nagel	1979
	Virginia Forrest	1980
	Bruce Peirano	1980
	Alice Greife	1981-
	Sally Vater	1981-
	David Stong	1982-
Masters:	Patrick Hurd	1975-77
Postdoctoral Advisor:	Martha Feller	1978-79

Undergraduate Teaching Experience:

1968-1971: Teaching Assistant and Lecturer, University of Cincinnati, Department of Chemistry, inorganic, organic and qualitative organic chemistry.

1966-1968: Teaching Assistant, Rutgers, Department of Chemistry, Freshman chemistry and qualitative analysis.

Major Research Interests:

Mechanisms in Chemical Carcinogenesis: Binding of Polynuclear Aromatic Hydrocarbons (PAHs) to Biopolymers; Chemical and Physical Properties of PAHs and their Relationship to the Environment, Metabolism of PAHs.

Theses:

Synthesis and Conformation of 1,3-Dioxanes, University of Illinois, B.S., 1966.

Determination of Photochemical and Photobiological Properties of Polynuclear Aromatic Compounds and Their Relationship to Carcinogenic Hazard, University of Cincinnati, Ph.D., 1972.

PUBLICATIONS:

1. Warshawsky, D., and Calvin, M. (1975). Tritium Incorporation at Specific Positions in Benzo(a)pyrene. Biochem. Biophys. Res. Comm. 63(3)541-547.

2. Meehan, T., Warshawsky, D., and Calvin, M. (1976). Specific Positions Involved in Enzyme Catalyzed Covalent Binding of Benzo(a)pyrene to Poly (G). Proceedings of the National Academy of Sciences, Vol. 73(4):1117-1120.

3. Morgan, D., Warshawsky, D., Bollinger, D., and Orchin, M. (1976). Polycyclic Aromatic Hydrocarbons and Their Heterocyclic Analogs: The Development of a Photodynamic Bioassay for the Determination of an Electronic Emission Spectral Index Related to the carcinogenic Hazard, and the Application of Time Resolved Phosphorimetry to the Quantitative Resolution of Complex Mixtures. National Institute of Occupational Safety and Health Publication. BOSH 099-71, HSM 99-72-77.

4. Warshawsky, D., Kerns, E.H., Bissell, M.F. and Calvin, M. (1977). Characterization of a Photoproduct of 7,12-Dimethylbenzanthracene and its Effect of Chick Embryo Cells in Culture. Biochem. Journal 164:481-486.

5. Morgan, D., and Warshawsky, D. (1977). The Photodynamic Immobilization of Artemia salina Nauplii by Polycyclic Aromatic Hydrocarbons and its Relationship to Carcinogenic Activity, Photochem. and Photobiol. 25:39-46.

6. Morgan, D., Warshawsky, D., and Atkinson, T. (1977). The Relationship Between Carcinogenic Activities of Polycyclic Aromatic Hydrocarbons and Their Singlet, Triplet, and Singlet-Triplet Splitting, Energies and Phosphorescence Lifetimes, Photochem. and Photobiol. 25:31-38.

7. Trosset, R.P., Warshawsky, D., Menefee, C., and Bingham, E. (1978). Investigation of Selected Potential Environmental Contaminants: Asphalts and Coal Tar Pitch, EPA Publication 56012-77-005.

8. Warshawsky, D., Niemeier, R.W., and Bingham, E. (1978). Influence of Particulates on Metabolism of Benzo(a)pyrene in the Isolated Perfused Lung. Carcinogenesis, Vol. 3, Polynuclear Aromatic Hydrocarbons, edited by P.W. Jones, and R.I. Freudenthal, Raven Press, new York, pp. 347-360.

9. Bingham, E., Warshawsky, D., and Niemeier, R.W. (1978). The Metabolism of Benzo(a)pyrene in the Isolated Perfused Rabbit Lung Following N-Dodecane Inhalation. Carcinogenesis, edited by T.J. Slaga, A. Sivak, and R.K. Boutwell, Raven Press, New York, pp. 509-516.

10. Dooley, J., Soukup, S., Warshawsky, D., and Christian, R. (1979). Metabolic Activation of Carcinogens by Irradiated and Non-irradiated Syrian Hamster Embryo Cells, In Vitro, 15(3):219.

11. Warshawsky, D., Schoeny, R., Hollingsworth, L., Moore, G.T., and Lorenzi, L., Jr. (1979). Screening Procedures to Determine Potential Mutagenicity of Products from Coal Hydrogenation and Gasification. Hazardous Material Risk Assessment, Disposal and Management Publication, pp. 78-84, Information Transfer Inc., Silver Spring, MD.

PUBLICATIONS: (continued)

12. Barkley, W., Warshawsky, D., Radike, M. (1979). Toxicology and Carcinogenic Investigations of Oil Shale Products, at Brookhaven National Labs. Publication on Assessing the Industrial Hygiene Monitoring Needs for Coal Conversion and Oil Shale Industries, BNL 51002, pp. 79-95.

13. Barkley, W., Warshawsky, D., Suskind, R.R., and Bingham, E. (1979). The Toxicology and Carcinogenic Investigation of Shale Oil and Shale Oil Products, Oak Ridge Publication on Potential Health and Environmental Effects of Synthetic Fossil Fuel Technologies, CONF-780903, pp. 157-162.

14. Warshawsky, D., Niemeier, R., Warren, C., and Bingham, E. (1979). The Effects of SO_2 on Metabolism of Benzo(a)pyrene in the Isolated Perfused Lung. Carcinogenesis. A Comprehensive Survey, edited by P.W. Jones and P. Leher. Ann Arbor Science Publishers, Ann Arbor, Mich., pp. 473-488.

15. Bingham, E., Trosset, R., and Warshawsky, D. (1979). Carcinogenic Potential of Petroleum Hydrocarbons. J. Env. Path. and Toxicol., 3:483-563.

16. Warshawsky, D., Niemeier, R.W. and Bingham, E. (1980). Study of the Effect of Whole Animal Exposure to Acid Mists and Particulates on Pulmonary Metabolism of Benzo(a)pyrene in the Isolated Perfused Lung Model. EPA Publication 600/1-80-029.

17. Warshawsky, D., Schoeny, R., Hollingsworth, L., Hund, M., and Moore, G. (1980). Mutagenicity and Chemical Characterization of Coal Liquefaction and Gasification Materials Included in Coal Conversion and the Environment: Chemical Biomedical and Ecological Considerations. Hanford Life Sciences, Battelle Northwest Press, In press.

18. Warshawsky, D., Bingham E., and Niemeier, R. (1980). The Effects of N-Dodecane Pretreatment on the Metabolism and Distribution of Benzo(a)pyrene in the Isolated Perfused Lung. Life Sci., 27(20), 1827-37.

19. Schoeny, R., Warshawsky, D., Hund, M., Nagel, B., and Smiddy, B.A. (1981). Mutagenicity of Benzo(a)pyrene Metabolites Generated in the Isolated Perfused Lung in Polynuclear Aromatic Hydrocarbons: Chemistry and Biological Effects, edited by A.J. Dennis and W.M. Cooke, Battelle Press, Columbus, OH, 475-486.

20. Schoeny, R., Warshawsky, D., Hollingsworth, L., Hund, M., and Moore, G. (1981). Mutagenicity of Coal Gasification and Liquefaction Products, EPA Second Symposium on Application of Short Term Bioassays in the Analysis of Complex Environmental Mixtures. Edited by M.D. Waters, S.S. Sandhu, T.L. Huisingh and L. Claxton, Plenum Press Co., 461-475.

21. Warshawsky, D., Niemeier, R., and Bingham, E. (1981). Effects of Particulate on Metabolism and Distribution of Benzo(a)pyrene in the Isolated Perfused Lung. Submitted to J. Env. Path. and Toxicol.

22. Warshawsky, D., Niemeier, R., and Bingham, E. (1981). Effects of Fe_2O_3 on the Metabolism and Distribution of Benzo(a)pyrene in the Isolated Perfused Lung. Submitted to Cancer Research.

23. Warshawsky, D., Morgan, D.D. and Calvin, M. (1981). Chemically and Biologically Active Positions of Benzo(a)pyrene, submitted to Cancer Biochem. Biophys.

PUBLICATIONS: (continued)

24. Warshawsky, D., Niemeier, R. and Bingham, E. (1981). The Influence of SO_2 on the Metabolism and Distribution of Benzo(a)pyrene in the Isolated Perfused Rabbit Lung. J. of Toxicol. and Env. Health, 7:1001-1024.

25. Schoeny, R., Warshawsky, D., Hollingsworth, L., Hund, M., and Moore, G. (1981). Fractionation and Mutagenicity of Coal Liquefaction and Gasification Products. Environmental Mutagenesis, 3(2), 181-195.

26. Warshawsky, D., and Myers, B. (1981). Metabolism of Dibenzo(c,g)carbazole in the Isolated perfused Rabbit Lung, Cancer Letters, 12:153-159.

27. Warshawsky, D., Radike, M., Schoeny, R., Barkley, W., and Bingham, E. Toxicological Responses to Multiple Factors in Complex Mixtures, Coal Workshop Conference on Liquid Fuels from Coal and Biomass. to be published as workshop proceedings, sponsored by Midwest Universities Energy Consorteum. October 5,6, 1981, Columbus, Ohio.

28. Warshawsky, D., Schoeny, R., and Moore, G. (1982). Evaluation of Coal Liquefaction Technologies by Salmonella Mutagenesis. Tox. Letters,10:(2-3)121-128.

29. Schoeny, R. and Warshawsky, D. (1982). Mutagenicity of Benzo(a)pyrene Metabolites Generated on the Isolated Perfused Lung Following Particulate Exposure. Teratogenesis, Carcinogenesis & Mutagenesis, in press.

TO BE SUBMITTED:

1. Warshawsky, D., Dickman, J., and Nagel, B. Studies of Physical Complexing of Polycyclic Aromatic Hydrocarbons with Polynucleotide Systems using Fluorescence Spectroscopy II. To be submitted to Biochemistry.

2. Warshawsky, D. and Calvin, M. Studies of Physical Complexing of Polycyclic Aromatic Hydrocarbons with Polynucleotide Systems using Fluorescence Spectroscopy I. To be submitted to Photochem. Photobiol.

3. Warshawsky, D. A chapter entitled, Carcinogenesis and Mutagenesis, for next edtion of text "The Industrial Environment - Its Evaluation and Control".

4. Warshawsky, D., et al. Effects of Pretreatment on the Metabolism of Dibenzo(c,g)-carbazole in the Isolated Perfused Lung. To be submitted to Toxicology.

5. Warshawsky, D., et al. Effects of Fe_2O_3 on the Metabolism of Dibenzo(c,g)carbazole in the Isolated Perfused Lung. To be submitted to Toxicology.

6. Warshawsky, D. et al. Metabolism and Mutagenicity of Dibenzo(c,g)carbazole. To be submitted to Cancer Research.

7. Warshawsky, D., Morgan, D.D., Niemeier, R., and Bingham, E. Kinetic Model for Rates of Metabolism of BaP in the IPL under a Variety of Environmental Conditions. To be submitted to Cancer Research, 1981.

8. Warshawsky, D. and Schoeny, R. Effects of Route of Exposure on Benzo(a)pyrene Metabolism in the Isolated Perfused Lung. To be submitted to Carcinogenesis.

9. Warshawsky, D., Smiddy, B.A., and Myers, B.L. Comparison of Benzo(a)pyrene and Dibenzo(c,g)carbazole Metabolism in the Isolated Perfused Lung. Submitted to Toxicology.

ABSTRACTS AND PRESENTATIONS:

1. Morgan, D., Warshawsky, D., and Miles, F. The Photosensitized Immobilization of A. salina Nauplii by Polynuclear Aromatic Hydrocarbons. Correlation of Carcinogenic and Photodynamic Activities. Presented at American Society for Photobiology, June 10-14, 1973, Sarasota, Fla.

2. Bissell, M.F., Kerns, E.H., Warshawsky, D., Bassaham, J., and Calvin, M. The Biochemical and Morphological Effects of a Derivative of Dimethylbenz-anthracene on Chick Embryo Cells in Culture. Presented at the American Cell Biology Meeting, November 21-23, 1974, San Diego, California, J. Cell Biology, 63:27a.

3. Bingham, D., Warshawsky, D., and Niemeier, R.W. The Metabolism of B(a)P in the Isolated Perfused Rabbit Lung Following N-Dodecane Inhalation Exposure. Presented at Symposium on Mechanisms of Tumor Promotion and Cocarcinogenesis, March 28-31, Gatlinburg, Tennessee.

4. Warshawsky, D., Niemeier, R., and Bingham, E. Influence of Particulate and SO_2 on B(a)P Metabolism. Presented at EPA Catalyst Research Program's Sulfuric Acid Research Conference, hendersonville, N.D. Jan. 31-Feb. 3, 1977.

5. Niemeier, R., Warshawsky, D., Bingham, D. Influence of Pretreatment on B(a)P Metabolism in the Isolated Perfused Lung. Presented at 16th Annual Society of Toxicology Meeting, March 29, 1977, Toronto, Canada.

6. Warshawsky, D., Niemeier, R.W., and Bingham, E. Influence of Particulates on Metabolism of Benzo(a)pyrene in the Isolated Perfused Lung. Presented at Second International Symposium on Polynuclear Aromatic Hydrocarbons, Sept. 28-30, 1977, Battelle Labs., Columbus, OH.

7. Warshawsky, D., Barkley, W., and Radike, M. (1978). Toxicology Carcinogenicity of Oil Shale Products, Symposium on Assessing the Industrial Hygiene Monitoring Needs for the Coal Conversion and Oil Shale Industries, Brookhaven National Laboratory, November 6 and 7, 1978.

8. Barkley, W., Warshawsky, D., Suskind, R.R., and Bingham, E. Toxicological Carcinogenic and Mutagenic Aspects of Shale Oil and Coal Conversion Components, Symposium on Potential Health and Environmental Effects of Synthetic Fossil Fuel Technologies, sponsored by Dept. of Energy, Gatlinburg, Tennessee, Sept. 25-28, 1978.

9. Warshawsky, D., Niemeier, R., and Bingham, E. Effects of SO_2 on the Isolated Perfused Lung. Presented at the Third International Symposium on Polynuclear Aromatic Hydrocarbons, Battelle, Columbus, OH, Oct. 25-27, 1978.

10. Warshawsky, D., Schoeny, R., Hollingsworth, L., Lorenzi, L., Jr., and Moore, G.T. Screening Procedures to Determine Potential Mutagenicity of Products from Coal Hydrogenation and Gasification, 1979, National Conference on Hazardous Material Risk Assessment, Disposal, and management, Miami Beach, Fla., April 25-27, 1979.

11. Warshawsky, D., Niemeier, R.W., Warren, C., Dickman, J., Bools, C., and Bingham, E. Effects of Particulate and SO_2 on the Metabolism of Benzo(a)pyrene in the Isolated Perfused Lung, Second Annual Cancer Research Conference of Ohio Valley-Lake Erie Association of Cancer Centers, Sharonville, Ohio, March 13, 1979.

ABSTRACTS AND PRESENTATIONS: (continued)

12. Schoeny, R.S., and Warshawsky, D. Use of Salmonella/Microsomal Assay in Evaluation of Benzo(a)pyrene Metabolites Produced in the Isolated Perfused Rabbit Lung Preparation, 10th Annual Environmental Mutagen Society Meeting, New Orleans, LA., March 8-12, 1979.

13. Dooley, J., Soukup, S., Warshawsky, D., and Christian, R. Metabolic Activation of Carcinogens by Irradiated and Non-irradiated Syrian Hamster Embryo Cells. 30th Annual Meeting of Tissue Culture Association, Inc., Seattle, Washington, June 10-14, 1979.

14. Schoeny, R., Warshawsky, D., Hollingsworth, L., Hund, M., and Moore, G. Mutagenicity of Coal Gasification and Liquefaction, Williamsburg, VA., April 1980, EPA Symposium on Application of Short-Term Bioassays in the Analysis of Complex Environmental Mixtures.

15. Warshawsky, D., Schoeny, R., Hollingsworth, L., Hund, M., and Moore, G. Mutagenicity and Chemical Characterizations of Coal Liquefaction and Gasification Materials, 20th Hanford Life Sciences Symposium, Richland, Washington, oct. 1980.

16. Warshawsky, D., Myers, B.L., and Nagel, B. Pulmonary Metabolism of Dibenzo(c,g)-carbazole: An N-Heterocyclic Aromatic. Fifth International Symposium on Polycyclic Aromatic Hydrocarbons, Oct. 1980, Battelle Columbus, OH.

17. Dooley, J., Warshawsky, D., and Christian, R.T. Investigation of PAH Metabolism and Mutagenicity Induced in Cell-Mediated Mutagenesis Assays. Fifth International Symposium on Polycyclic Aromatic Hydrocarbons, Oct. 1980., Battelle Columbus, OH.

18. Schoeny, R., Warshawsky, D., Hund, M., Nagel, B., Smiddy, B.A. and Warren, C. Mutagenicity of Benzo(a)pyrene Metabolites Generated in the Isolated Perfused Lung. Fifth International Symposium on Polycyclic Aromatic Hydrocarbons, Oct. 1980., Battelle Columbus, OH.

19. Warshawsky, D., Myers, B.L., Smiddy, B.A., and Nagel, B. Comparison of Bnezo(a)pyrene and Dibenzo(c,g)carbazole Metabolism in the Isolated Perfused Lung, Organ and Species Specificity in Chemical Carcinogenesis, Raleigh, NC, March 24, 1981.

20. Warshawsky, D., Myers, B.L., Nagel, B., Smiddy, B.A. and Miller, M. Effects of Fe_2O_3 on the Pulmonary Metabolism of 7-H-Dibenzo(c,g)carbazole in the Isolated Perfused Lung, American Association for Cancer Research, Washington, D.C., april 27-30, 1981.

21. Schoeny, R. and Warshawsky, D. Mutagenicity of Pulmonary Metabolites of Benzo(a)pyrene in Association with particles, Environmental Mutagen Society, San Diego, CA, March 5-8, 1981.

22. Dooley, J.F., Warshawsky, D., Yerganian, G., and Christian R.T. Cell Mediated Mutagenesis of a Non-Tumorigenic Epithelial Cell Line with Polycyclic Aromatics and Heterocyclic Hydrocarbons, Tissue Culture Association, Washington, D.C., June 7-11, 1981.

23. Schoeny, R., Warshawsky, D. In Vitro Mutagenicity Testing of Ohio Coal-derived materials, January 1982, Chapel Hill, NC, EPA Symposium on application of short-term bioassays in the Analysis of Complex Environmental Mixtures.

ABSTRACTS AND PRESENTATIONS: (continued)

24. George, J.D., Manson, J.M., Vater, S., and Warshawsky, D. In Vivo Metabolism of 3MC in Pregnant C57BL/6 and DBA/2 Mice, Society of Toxicology, Boston, Mass., February 1982.

25. Warshawsky, D., Radiek, M., Schoeny, R., Barkley, W., and Bingham, E. Toxicological Responses to Multiple Factors in Complex Mixtures, Coal Workshop Conference on Liquid Fuels from Coal and Biomass, to be published as workshop proceedings, sponsored by Midwest Universities Energy Consorteum. Oct. 5,6, 1981, Columbus, OH.

26. Dooley, J., Schoeny, R., Christian, R. and Warshawsky, D. Mutagenicity of 7H-Dibenzo(c,g)carbazole and its Metabolites in a Chinese Hamster Epithelial Cell Line and Salmonella. Environmental Mutagen Society, Boston, Mass., February 1982.

27. Warshawsky, D., Myers, B.L., Dooley, J., Schoeny, R. and Christian, R. Metabolism of 7H-Dibenzo(c,g)carbazole in Sprague Dawley Rat Liver Microsomes, American Association for Cancer Research, St. Louis, MO, April 1982.

28. Dooley, J., Schoeny, R., Warshawsky, D., and Christian, R. The Response of Cultured Chinese Hamster Cells (DPI-3) and Salmonella to 7H-Dibenzo(c,g)-carbazole and its Metabolites. Tissue Culture Association, San Diego, CA, June 6-10, 1982.

29. Warshawsky, D., Cody, T., Radike, M., Smiddy, B.A., and Nagel, B. Toxicity and Metabolism of Benzo(a)pyrene in the Green Alga Selanastrum capricornutum. The International Symposium on Polycyclic Aromatic Hydrocarbons, Battelle, Columbus, OH, Oct. 1982.

INVITED PRESENTATIONS:

1. Warshawsky, D. Photochemical and Biological Effects of Polynuclear Aromatic Hydrocarbons and Their Relationship to the Carcinogenic Hazard. Presented at Stanford Research Institute, August 28, 1975.

2. Niemeier, R., Warshawsky, D., Brooks, S., and Radike, M. Safety Standards for Research Involving Chemical Carcinogens. Department of Environmental Health, University of Cincinnati, OH., College of Medicine, May 26, 1976.

3. Warshawsky, D. Cancer and the Environment: a) How Chemicals Cause Cancer. b) Air Pollution and Cancer. Co-sponsored by American Cancer Society, Department of Environmental Health and CONMED, University of Cincinnati, November 18, 1976.

4. Warshawsky, D. Environmental Chemical Carcinogens. Department of Chemistry, University of Cincinnati, OH, March 4, 1977.

5. Warshawsky, D. Aspects of Environmental Chemical Carcinogenesis. Battelle Pacific Northwest Labs., July 21, 1977.

6. Warshawsky, D., Anderson, L., Young, R., Fulwiler, R., Meyer, C., Cruther, B., and Suskind, R. Symposium on Cancer and the Worker, Carcinogens in the Workplace. Sponsored by Department of Environmental Health and Cincinnati Chamber of Commerce, October 5, 1978.

7. Warshawsky, D. Use of Fluorescence Techniques to Investigate Nonbonding Interactions of Polynuclear Aromatic Hydrocarbons with DNA, Fluorescence Symposium, St. Louis, MO., Feb. 16, 1978.

8. Warshawsky, D. Metabolism of PAHs in the IPL. Battelle Columbus, OH., April 22, 1980.

9. Warshawsky, D. Metabolism of Polycyclic Aromatic Hydrocarbons. University of Rochester, N.Y., Division of Toxicology, April 15, 1980.

10. Warshawsky, D. and Manson, J. Genetic Toxicology of Coal Related Materials. Joint EPA Symposium and Civil and Environmental Engineering, University of Cincinnati, December 4, 1980.

11. Warshawsky, D. Biotransformations of Heterocyclic Aromatic Hydrocarbons, Ralph E. Oesper and Helen W. Oesper Memorial Lecture Series Honoring Melvin Calvin, University of Cincinnati, Oct. 12-13, 1981.

Seminar Speakers Invited:

Dr. Richard Pelroy, "Mutagenicity of Shale Oil and Shale Oil Components", Battelle, Northwest, Richland, Washington, Feb. 17, 1978.

Susan Hawkes, "Transformed and Normal Cells", Chemical Biodynamics Laboratory, University of California, Berkeley, California, May 31, 1978.

PAST AND CURRENT RESEARCH SUPPORT:

Environmental Protection Agency, "The Effect of Whole Animal Exposure to Acid Mists and Particulates on Pulmonary Metabolism of Benzo(a)pyrene in the Isolated Perfused Lung Model", Co-investigator, Jan. 1975 - April 1977, Principal Investigator, April 1977 - December 1977, $135,000, EPA 68-02-1678.

National Cancer Institute, "Pulmonary Metabolism of Benzo(a)pyrene, Co-investigator, Jan. 1975 - April 1977, Principal Investigator, April 1977 - December 1977, $108,574, CA15344-03.

National Cancer Institute, "Pulmonary Metabolism of N-heterocyclic Aromatics", Principal Investigator, April 1, 1978 - June 30, 1981, $153,241, CA23515.

Environmental Protection Agency, "Study of the Effects of Whole Animal Exposure to Particulates on the Pulmonary Metabolism and Mutagenicity of Benzo(a)pyrene in the Rabbit Isolated Perfused Lung Model", Principal Investigator, Oct. 1, 1978 - Oct. 1, 1980, $105,000, EPA 68-02-2975.

Department of Energy, "Exploratory Research on Mutagenic Activity of Coal Related Materials", Principal Investigator, July 15, 1978 - June 30, 1981. $117,000.

American Cancer Society, "Metabolism of a Mammary Carcinogen, DMBA", Principal Investigator, July 1, 1979 - July 1, 1980, $6,000.

Ohio Coal Research Laboratory Association - State Consortium of Universities - Coal Research, "In Vitro Mutagenicity Testing of Ohio Coal-Derived Materials", Principal Investigator, May 15, 1980 - September 30, 1982, $56,000.

Environmental Protection Agency, "Cell Death and Somatic Mutation in Teratogenesis", Co-investigator. October 1980-82, $330,000.

University Research Council, "Biotransformation of PAHs by Plants", Principal Investigator, March 1, 1981 - Feb. 28, 1982, $3,020.

University Research Council, Funds for travel to American Association for Cancer Research Meeting, April, 1981.

Environmental Protection Agency, "The Biotransformation of PAHs by Plants", Principal Investigator, Sept. 7, 1981 - Sept. 6, 1983, $300,000.

Department of Energy, "Exploratory Research on the Mutagenic Activity of Coal Related Materials", Principal Investigator, Nov. 1, 1981 - Oct. 30, 1982, $46,000.